

**ABSTRACT**

This invention comprises a new process for developing high regression rate propellants for application to hybrid rockets and solid fuel ramjets. The process involves the use of a criterion to identify propellants which form an unstable liquid layer on the melting surface of the propellant. Entrainment of droplets from the unstable liquid-gas interface can substantially increase propellant mass transfer leading to much higher surface regression rates over those that can be achieved with conventional hybrid propellants. The main reason is that entrainment is not limited by heat transfer to the propellant from the combustion zone. The process has been used to identify a new class of non-cryogenic hybrid fuels whose regression rate characteristics can be tailored for a given mission. The fuel can be used as the basis for a simpler hybrid rocket design with reduced cost, reduced complexity and increased performance.

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